

NOTES

ON AN

EPIDEMIC OF DIPHTHERIA.

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FETTERCAIRN, KINCARDINESHIRE.

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A STRONG sense of the great necessity for increasing our knowledge, from every available source, with the nature, progress, and treatment of epidemic diseases, especially those of recent origin, has urged me to trespass the following notes of an epidemic of diphtheria, which occurred in the district where I practise, on my professional brethren. I am encouraged in this, by entertaining the hope, that any light that can be thrown upon such a malady as diphtheria, with respect either to its pathology or treatment, cannot fail just now to be of some service, as the amassing of the opinions of the greatest possible number of observers being of paramount importance, that proper conclusions may be attained concerning a disease which has excited strong alarm in the public mind, and found by the profession to be one of the most formidable diseases they have to encounter. This feeling induces me to add my quota to the general stock already furnished.

The following notes are, in the first instance, taken from cases which occurred at a farm situated at the foot of the Grampians, in the parish of Fordoun, Kincardineshire. The farm-house, cottages, and offices, are built upon an eminence of gravel considerably above the sea-level; shelves of trap-rock appear at the surface within a few yards of the buildings; the sanitary arrangements about the premises seem faultless; and, to add to other circumstances in its favour as a healthy place of residence, a burn flows fresh and uncontaminated from the hills, in considerable volume and force, almost washing the sides of the buildings in its course.

The first case occurred in August last. A. M., æt. 16 years, states that he was seized on the 20th instant with violent diarrhœa, while at work gathering in the harvest-field; the cause he assigned, was drinking very freely of cold water when in a state of profuse

perspiration (the water was also said to have a bad taste). He continued at work, although very unable, till the 22d. I was requested to visit him on the 23d; when he complained of great prostration,—so much so, that he could not raise his head from the pillow, or lift his hands to his mouth; he had no pain; complained of incessant thirst; no appetite; tongue pale and moist; uvula and tonsils glazed, inflamed, and slightly œdematous; he felt a little uneasiness when he attempted to swallow; bowels still slightly relaxed; urine not observed; pulse 80, soft, and very compressible; face flushed; skin warm; no eruption. At the urgent request of his parents, he was removed home, a distance of three miles. Treatment was delayed until the evening of that day in consequence, when a solution of nitrate of silver ʒiv. , to ʒj. aqua, was freely applied to the fauces with a sponge, and ordered to be repeated every six hours; to gargle every hour with Potass Chlorat. ʒiss. , Aqua tepida ʒviij. , Acid. Hydrochlor. Fort. ʒiss. , Tinct. Catechu ʒvj. , Glycerine ʒiss. ; Misce. To have Potass Nitratis gr. viij., Liq. Amm. Acet. ʒiij. , Mist. Camphor ʒj. every four hours, with a liberal allowance of port-wine and beef-tea. On the 25th, exudative false membrane formed a glassy curtain from tonsil to tonsil, which was torn at each inspiration, and as rapidly repaired; no patches of ulceration could be seen; deglutition was now very painful and difficult, the breathing more hurried, the heart's action gradually more feeble, until death occurred by asthenia on the morning of the 28th. I learned that he had suffered from want of appetite and general weakness for some few months prior to his fatal attack.

It is worthy of remark here, that with the exception of the father and brother of the deceased suffering from a slight attack of tonsillitis, a few days after the young man's death, diphtheria did not make its appearance again here until January of the present year, when another outbreak occurred at the same place where A. M. was taken ill, but this time proving itself to be an invasion of a more formidable character.

On the 9th January 1860, I visited S. R., æt. 17 years, farmer's daughter. She states that she had felt sickness and severe headache, chilliness alternating with a sense of heat, for two days; and this morning she felt sore throat, with pains in her back and limbs, accompanied with a feeling of numbness. Her eyes were glazed; countenance rather flushed; skin hot, no eruption; tongue covered with a thick brown fur; fauces glazed, and of a dark-red or claret colour; tonsils swelled, with a white patch like a split pea on the left one; deglutition slightly impeded; bowels costive; urine scanty, specific gravity 1035, not albuminous; under the microscope it presented the molecular or granular form of urate of ammonia; catamenia regular; pulse 90, soft and compressible.

Treatment.—I applied solid nitrate of silver freely to the patch of ulceration; and followed that by liberal sousing of the tonsils and

pharynx with Solutio Ferri Perchlorid. every six hours; gargling every hour with Alum, Acid. Hydrochloric $\bar{a}\bar{a}$ \bar{z} iss., Tinct. Catechu \bar{z} vj., Glycerine \bar{z} iss., Aqua \bar{z} x. Misce. To have Potass nitratis gr. x., Pulv. Ipecac. Co. gr. vj., Pulv. Jacobi gr. v. immediately; to be followed in four hours with Pulv. Jalap Co. \bar{z} ij. 10th.—Headache less violent; perspired freely during the night; no eruption; bowels opened; throat feels worse; deglutition very difficult; tongue moist, and covered with brown fur; exudation upon the velum palati; the patch of ulceration larger; pulse 85, smaller. To continue sponging with the Ferri Perchlorid. and gargling; to take Sol. Ferri Perchl. \bar{m} . xxx. every three hours, accompanied with frequent draughts of beef-tea. This treatment was continued most faithfully until the 13th, with the application of Tinct. Iodin. Co. over the cervical glands twice a-day, until the cuticle separated, when she began slowly but steadily to improve.

On the 14th, her nurse was seized with all the premonitory symptoms of the same disease; but after the application of a blister to the throat, and frequent brushing of the fauces with Ferri Perchlorid., it ended in a smart attack of tonsillitis. She continued very weak, however, for some time after.

On the 16th, other two of the family were seized. One, an infirm lady of 74 years; the other about 50 years of age. The eldest, B. R., had suffered from frequent severe rheumatic attacks for upwards of 20 years. She states that her throat became sore the previous evening (15th): she now feels pains over all her body, and very much depressed; pulse 60, feeble and irregular; skin cool, no eruption; tongue pale and moist; both tonsils studded with patches of ulceration; bowels regular; urine very scanty, specific gravity 1026; no albumen.

Treatment.—The Ferri Perchl. was applied as in S. R.'s case, and \bar{z} ss. taken every three hours, with port-wine, brandy, and beef-tea. 17th.—The velum palati tissues covered with false membrane; deglutition painful and difficult; pulse very feeble and intermittent. On the 18th, paralysis of the velum completely prevented deglutition; enemata of beef-tea, and other nourishment, with stimulants, were alike useless. The application of Ferri Perchl. to the fauces was continued, with the fumigation of the tonsils with chlorine gas. The latter experiment seemed to soothe for a time the inflamed mucous surface; after inhaling the gas for a few minutes, she would fall into a short doze. It had no influence, however, upon the exudation, which continued actively to form and harass her with the distressing feeling of suffocation. The membrane ceased to form on the 22d, when her breathing became somewhat relieved; the power of swallowing did not, however, improve. She died by asthenia on the 23d.

Her sister, A. R., who was taken ill on the same day with symptoms quite the same, but which did not assume so malignant a character; similar treatment was adopted as in S. R.'s case, and her attack was conducted to a favourable issue on the 25th. The next

case occurred in a housemaid, and ended in tonsillitis. Two men in the bothy had the same. The griever had genuine diphtheria. The same treatment was adopted; and he became convalescent in 12 days. His wife and three children had diphtheritic sore throat (tonsils inflamed, swelled, and ulcerated, but no false membrane). Another child of the same family had scarlatina, the eruption well developed. The other members of the family had suffered from scarlatina before;—they all recovered. The cattleman, who lived in the adjoining cottage to the griever, had diphtheritic sore throat, and made a tardy recovery; two of his children had scarlatina of a mild type.

Here, then, was a little community of 19 individuals, 4 of whom suffered from genuine diphtheria, 5 from diphtheritic sore throat, 3 from scarlatina, 3 from tonsillitis, and four—the farmer, his eldest sister, the cattleman's wife, and a boy in the bothy—escaped.

The very natural conjecture now arose, what was the cause of the disease taking up its abode at that apparently healthy situation? As I before hinted, the water they used was said to have a bad taste; and I must confess I did not consider it an inviting beverage when I tasted it. I chanced to mention this to the proprietor of the farm, Sir John S. Forbes, Bart., when he expressed a desire to have it analysed; when I sent samples of it to Dr S. Macadam, Edinburgh, for analysis. The following is his reply.

I may mention that the source of the water is an open stream from the hills (not a spring); it is collected in a dam near the farm, where it is always discharging, and is carried by a pipe to the pump placed near the house.

(Copy.)

SCHOOL OF ARTS AND SURGEONS' HALL,
EDINBURGH, 10th February 1860.

DR FORMAN, Fettercairn.

DEAR SIR,—I have carefully examined the two samples of water forwarded by you to me, and referred to in your note of the 6th inst.

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|-----------------------------------------------------------------------------|---|---|---|---|--------------|
| The "Craigmiston dam water" contains saline matter, in one imperial gallon, | . | . | . | . | 3.12 grains. |
| Organic matter, | . | . | . | . | 1.68 „ |

| | | |
|------------------------------------------------------------------------------|---|--------------|
| Total matter dissolved therein, | . | 4.80 grains. |
| The "Craigmiston pump water" contains saline matter, in one imperial gallon, | . | 4.80 grains. |
| Organic matter, | . | 2.08 „ |

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| Total matter dissolved therein, | . | 6.88 grains. |
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It would thus appear, that after the water leaves the dam, and as it issues from the pump, it contains more saline matter and organic constituents than when stored in the dam. On examination of the several ingredients dissolved in the water, I find that a small

amount of nitrates are present in the pump water, which are not in the dam water; and this fact taken in conjunction with the increase in the total amount of the matter dissolved in the pump water, as compared with what is present in the dam water, leads me to infer that the water, after it leaves the dam, gets contaminated with decomposing organic matter, in part, of animal origin. Considering the comparatively large amount of organic matter in the pump water, and its nature, I quite agree with you in considering it possible that the habitual use of this water might predispose certain parties, of peculiar constitutions, to an attack of diphtheria or other disease.—I am, dear Sir, yours sincerely,

(Signed) STEVENSON MACADAM, Ph.D., F.R.S.E.,
Lecturer on Chemistry, etc.

The next cases which came under my notice were in the village of Fettercairn, about two miles distant from the place where the cases just cited occurred. The most minute inquiry could not discover any communication between the parties affected.

On the 16th February, I was requested to visit a child of three and a half years of age, said to be very ill of croup. I saw the little sufferer at 9 A.M., when I at once pronounced him *moribund*. He had crowing inspiration, pallid face, staring eyes, and a very feeble pulse. Examination of his throat at once revealed the true cause of the *stridulous laryngismus*: the pharynx and tonsils were coated with a thick greyish-white membrane, the adjoining parts presented a glazed claret colour, and the cervical glands were much enlarged. The crowing inspiration was observed by his parents at 6 A.M. of that day; it ceased at 2 P.M., and he sank an hour afterwards. No treatment was attempted, no *post-mortem* allowed.

The child was of a strumous diathesis, and had been in a feeble condition for some time before his fatal illness.

This case led me to examine the whole family immediately, when I found the mother and other four children more or less affected with diphtheria. One child, 2 years old, far advanced in the disease; both tonsils œdematous and ulcerated, with hurried breathing and feeble pulse. Ferri Perch. was freely applied to the fauces, and ten drops prescribed, with port-wine, every three hours; Tinct. Iodini Co. to the cervical glands. At 5 P.M. crowing inspiration commenced; the face assumed a livid hue, with small quick pulse. Ten-grain doses of Cupri Sulphas were given at varied intervals, with the view of detaching any false membrane that might have formed in the air-passages by vomiting, but none was discharged. In this respect diphtheria seems to differ from genuine croup: in the latter disease, when sulphate of copper is freely administered, copious vomiting of mucous and false membrane is invariably produced, with great relief to the little sufferer. This circumstance induces me to believe that the crowing inspiration in diphtheria is not the result of false membrane in the air-passages only, but rather to

pressure upon the glottis by the rapidly enlarging cervical gland. The ingenious view taken by Dr Ley of the special pathology of this child-crowing in diphtheria, merges in the more general principles of reflex function advanced by the late Dr Marshall Hall.

The *stridulous laryngismus* was relieved in this case by the vomiting, but the disease continued its fatal course; convulsive struggles closed the scene at 8 o'clock on the following morning. The same treatment, with the exception of the emetics, was adopted in the case of the other members of the family, and they all made a good recovery.

The next case that occurred was a child of three years of age, in another family in the same place. I was requested to visit it at 2 A.M. on the 21st inst., when I found the little patient struggling for breath; he had loud crowing, face flushed, and a very rapid pulse; both tonsils very much inflamed and enlarged, almost meeting each other, and a small speck of ulceration on the pharynx. Free vomiting was at once produced with sulphate of copper, which brought up a large quantity of mucus. Ferri Perch. was then applied, and repeated every eight hours, and ten drops taken in portwine every three hours, and Tinct. Iodini Co. to the cervical glands. The following day he seemed almost well, until evening, when another suffocative attack returned; the sulphate of copper was again had recourse to, and the other treatment continued with success.

I have now treated 15 cases of genuine diphtheria, and 37 of diphtheritic sore throat, according to the principles just stated, with the satisfactory result of only two of the former and one of the latter terminating fatally.

Should the epidemic continue its march in this neighbourhood, I will note any peculiar features that may occur to me as being worthy of record. I will only add further, that I am entirely at a loss to find anything attractive, in an etiological point of view, for diphtheria taking up its abode here. It certainly leads us to believe that it does not obey any known climatic or meteorological laws; it seems to visit equally crowded localities, and the open hamlets of rural districts; it has also been remarked to ravage the marshy and ill-drained land, and dry and elevated stations, with equal rage. It seems vain to attribute it, as is done without reflection, to poverty, want of cleanliness, over-crowding, cesspools, dungheaps, and other items in the unsavoury catalogue, which have commonly the discredit of every outbreak of endemic disease in a neighbourhood. Filth and poverty, and crowded rooms, have ever been the sad heritage of the agricultural labourer; but diphtheria is only of recent origin. Doubtless these bad sanitary adjuncts, combined with irregularities of regimen, cold drinks when the body is in a heated state, sudden changes of temperature, and over-exertion, are exciting causes; and as all these produce debility, so is the disease itself adynamic. But the true and specific cause of diphtheria, as

of other forms of disease, is a something superadded, and which our senses have not yet distinguished.

From the microscopical examinations I have made of the false membrane collected, I could not discover the sporules of a fungus, alleged to be present by some observers. It seemed to consist of simple exudation of molecular fibres and plastic corpuscles, produced by local inflammatory action,—the result of a specific poison in the system of an adynamic nature, manifesting itself *at the throat*; the poison which constitutes the *materies morbi* being chiefly eliminated by the mucous membrane of the pharynx and adjoining parts, just as other blood poisons are eliminated by the skin, kidneys, or bowels. In comparison, diphtheria has a strong analogy with scarlatina. A very fortunate kindred also exists between the two maladies, inasmuch as they are both of an erysipelatous nature, and equally demand a *tonic* and *antiseptic* course of treatment; and although it would be mere charlatanism to assert that this or that application should be used in conjunction with any specific medicine, yet, from the cases which have come under my notice, I am strongly impressed with the propriety and success of the plan of treatment which I pursued in the management of a malady terrible to behold, —whose very name spreads dismay and dread to all around, yet whose severity and fearful characteristics seem to succumb to the judicious and speedy treatment of the attentive physician with a kindness hardly to be expected.

